WHAT IS CLAIMED IS:

1. A microwave applicator comprising a circular waveguide having a surface provided with a plurality of slots for radiating microwaves, wherein the centers of the plurality of slots are offset in a direction parallel to the surface with respect to the center of the circular waveguide.

2. The microwave applicator according to Claim 1, wherein the plurality of slots are offset inside with regard to the center of the circular waveguide.

3. The microwave applicator according to Claim 2, wherein the surface is further provided with another plurality of slots which are offset outside with regard to the center of the circular waveguide.

4. The microwave applicator according to Claim 1, wherein the circular waveguide is an endless circular waveguide, and wherein the circumferential length of the endless circular waveguide is an integer multiple of the guide wavelength of microwaves.

5. The microwave applicator according to Claim 1, wherein the length of the plurality of slots is selected from the range of 1/4 to 3/8 of the guide wavelength of microwaves.

6. The microwave applicator according to Claim 1, wherein microwaves of TE_{10} mode are introduced into the circular waveguide.

7. The microwave applicator according to Claim 1, wherein the surface is an H-plane of the circular waveguide.

8. The microwave applicator according to Claim 1, wherein the plurality of slots are arranged at an interval of 1/2 or 1/4 of the guide wavelength of microwaves.

9. The microwave applicator according to Claim 1, wherein the surface is further provided with a dielectric member which covers the plurality of slots.

10. The microwave applicator according to Claim 1, wherein the surface is interchangeable.

11. A microwave applicator comprising a circular waveguide having a flat surface provided with a plurality of slots for radiating microwaves, wherein the plurality of slots are discontinuous linear slots provided in a direction intersecting the microwave travelling direction.

12. The microwave applicator according to Claim 11, wherein the circular waveguide is an endless circular waveguide, and wherein the circumferential length of the endless circular waveguide is an integer multiple of the guide wavelength of microwaves.

13. The microwave applicator according to Claim 11, wherein the length of the plurality of slots is selected from the range of 1/4 to 3/8 of the guide wavelength of microwaves.

14. The microwave applicator according to Claim 11, wherein microwaves of TE_{10} mode are introduced into the circular waveguide.

15. The microwave applicator according to Claim 11, wherein the surface is an H-plane of the circular waveguide.

16. The microwave applicator according to Claim 11, wherein the plurality of slots are arranged at an interval of 1/2 or 1/4 of the guide wavelength of microwaves.

17. The microwave applicator according to Claim 11, wherein the surface is further provided with a dielectric member which covers the plurality of slots.

18. The microwave applicator according to Claim 11, wherein the surface is interchangeable.

19. A plasma processing apparatus comprising an internally evacuatable container and a gas supply port for supplying a processing gas into the container, for applying plasma processing to an article arranged in the container, further comprising the microwave applicator as set forth in Claim 1 as means for applying a microwave energy for generating a plasma of the gas in the container.

20. The plasma processing apparatus according to Claim 19, wherein the gas supply port is provided in a side wall of the container.

21. The plasma processing apparatus according to Claim 19, wherein the gas supply port is provided nearer to the surface than to the article.

22. The plasma processing apparatus according to Claim 19, wherein the processing gas is emitted from the gas supply port to the surface.

23. The plasma processing apparatus according to Claim 19, wherein the container is provided with an exhaust pump that reduces the pressure inside the

container to 1.34×10^3 Pa or less.

24. A plasma processing method of plasma processing an article, comprising using the plasma processing apparatus as set forth in Claim 19 to plasma process the article.

25. The plasma processing method according to Claim 24, which is at least one of ashing, etching, cleaning, CVD, plasma polymerization, doping, oxidation and nitridation.

26. The plasma processing method according to Claim 24, comprising ashing a 200 mm wafer with the circumferential length of the circular waveguide being 2 or 3 times the guide wavelength of microwaves.

27. A plasma processing apparatus comprising an internally evacuatable container and a gas supply port for supplying a processing gas into the container, for applying plasma processing to an article arranged in the container, further comprising the microwave applicator as set forth in Claim 11 as means for sullying a microwave energy for generating a plasma of the gas in the container

28. The plasma processing apparatus according to

Claim 27, wherein the gas supply port is provided in a side wall of the container.

29. The plasma processing apparatus according to Claim 27, wherein the gas supply port is provided nearer to the surface than to the article.

30. The plasma processing apparatus according to Claim 27, wherein the processing gas is emitted from the gas supply port to the surface.

31. The plasma processing apparatus according to Claim 27, wherein the container is provided with an exhaust pump that reduces the pressure inside the container to 1.34×10^3 Pa or less.

32. A plasma processing method of plasma processing an article, comprising using the plasma processing apparatus as set forth in Claim 27 to plasma process the article.

33. The plasma processing method according to Claim 32, which is at least one of ashing, etching, cleaning, CVD, plasma polymerization, doping, oxidation and nitridation.

34. The plasma processing method according to

Claim 32, comprising etching a 300 mm wafer with the circumferential length of the circular waveguide being 4 times the guide wavelength of microwaves.

35. The plasma processing method according to Claim 32, comprising ashing a 200 mm wafer with the circumferential length of the circular waveguide being 2 or 3 times the guide wavelength of microwaves.

36. A structure processed by the plasma processing method as set forth in Claim 24 or 32.

37. A plasma processing apparatus comprising a container, a gas supply port for supplying a processing gas into the container, and a microwave applicator for supplying microwaves into the container through a dielectric window, the microwave applicator comprising an endless circular waveguide having a plurality of slots provided at a predetermined interval in a plane thereof in contact with the dielectric window, wherein the centers of the slots are on a circle having a radius r_c approximately represented by

$$r_c=n_1\lambda_s/\{2\tan(\pi/(2n_g))\}\{1+\cos(\pi/n_g)\}$$

wherein n_1 is the number of antinodes of surface standing waves generated between the slots, λ_s is the wavelength of surface waves, n_g is the ratio of the circumferential length l_g of the circular waveguide to

the guide wavelength λ_g.

38. The plasma processing apparatus according to Claim 37, wherein the value of n_g is within the range of 2 to 5.

39. The plasma processing apparatus according to Claim 37, wherein the angular spacing of the slots is represented by π/n_g.

40. The plasma processing apparatus according to Claim 37, wherein the number n_1 of antinodes of surface standing waves generated between the slots is any one of 3, 5 or 7.

41. The plasma processing apparatus according to Claim 37, wherein the dielectric window comprises aluminium nitride as a main component.

42. A plasma processing method comprising the steps of placing an article in a container with a microwave transmissive dielectric window; evacuating the container; introducing a processing gas into the container; and supplying microwaves into the container through an endless circular waveguide having a plurality of slots provided by perforation at a predetermined interval in a plane thereof in contact

with the dielectric window and configured such that the centers of the slots are on a circle having a radius r_c approximately represented by

$$r_c=n_1\lambda_s/\{2\tan(\pi/(2n_g))\}\{1+\cos(\pi/n_g)\}$$

wherein n_1 is the number of antinodes of surface standing waves generated between the slots, λ_s is the wavelength of surface waves, n_g is the ratio of the circumferential length l_g of the circular waveguide to the guide wavelength λ_g, thereby generating a plasma in the container.

43. The plasma processing method according to Claim 42, which effects film formation on the article by the chemical vapor deposition.

44. The plasma processing method according to Claim 42, which effects etching of the article.

45. The plasma processing method according to Claim 42, which effects ashing of the article.

46. The plasma processing method according to Claim 42, which effects doping of the article.

47. A plasma processing apparatus comprising an internally evacuatable container and a gas supply port for supplying a processing gas into the container, for

plasma processing an article arranged in the container, further comprising means for supplying a microwave energy for generating a plasma of the gas in the container, the means comprising an endless circular waveguide having a plurality of slots provided at a predetermined interval in a plane on the dielectric window side thereof, wherein the centers of the plurality of slots are offset in a direction parallel to the plane with respect to the center of the circular waveguide such that the centers of the slots are on a circle having a radius r_c approximately represented by

$$r_c=n_1\lambda_s/\{2\tan(\pi/(2n_g))\}\{1+\cos(\pi/n_g)\}$$

wherein n_1 is the number of antinodes of surface standing waves generated between the slots, λ_s is the wavelength of surface waves, n_g is the ratio of the circumferential length l_g of the circular waveguide to the guide wavelength λ_g.

48. The plasma processing apparatus according to Claim 47, wherein the value of n_g is within the range of 2 to 5.

49. The plasma processing apparatus according to Claim 47, wherein the angular spacing of the slots is represented by π/n_g.

50. The plasma processing apparatus according to

Claim 47, wherein the number n_1 of antinodes of surface standing waves generated between the slots is any one of 3, 5 or 7.

51. The plasma processing apparatus according to Claim 47, wherein the dielectric window comprises aluminium nitride as a main component.

52. A plasma processing method of plasma processing an article, comprising using the plasma processing apparatus as set forth in Claim 47 to plasma process the article.

53. The plasma processing method according to Claim 52, which is at least one of ashing, etching, cleaning, CVD, plasma polymerization, doping, oxidation and nitridation.

54. The plasma processing method according to Claim 52, comprising ashing a 200 mm wafer with the circumferential length of the circular waveguide being 3 times the guide wavelength of microwaves.

55. The plasma processing apparatus according to Claim 47, wherein the gas supply port is provided in a side wall of the container.

56. The plasma processing apparatus according to Claim 47, wherein the gas supply port is provided nearer to the plane provided with the plurality of slots than to the article.

57. The plasma processing apparatus according to Claim 47, wherein the processing gas is emitted from the gas supply port to the plane provided with the plurality of slots.

58. The plasma processing apparatus according to Claim 47, wherein the container is provided with an exhaust pump that reduces the pressure inside the container to 1.34×10^3 Pa or less.

59. A method of producing a structure, comprising the step of using the plasma processing apparatus as set forth in Claim 19 or 47 to plasma process the article.